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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/558,169 | 11/22/2005 | Guenther Baschek | 2003P03453WOUS | 1917 |

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| EXAMINER | |
|---|---|
| ENIN-OKUT, EDU E | |
| **ART UNIT** | **PAPER NUMBER** |
| 1727 | |
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| 05/13/2011 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/558,169 | BASCHEK ET AL. | |
| | Examiner | Art Unit | |
| | Edu E. Enin-Okut | 1727 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *28 March 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *12,13,20-27,29 and 30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12,13,20-27,29 and 30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

**FUEL CELL AND HEATING DEVICE OF A FUEL CELL**

***Detailed Action***

1. The amendments filed on March 28, 2011 were received. Applicant has amended claims 12, 29 and 30. Claims 12, 13, 20-27, 29 and 30 are pending.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 102***

7. The rejection of claims 12-13 and 22-23 under 35 U.S.C. 102(b) as being anticipated by Mattejat et al. (US 5,472,801) is withdrawn because claim 12 was amended.

***Claim Rejections - 35 USC § 103***

8. Claims 12-13, 22-27, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi et al. (US 2003/0162078) in view of Hulswitt et al. (US 4,569,391).

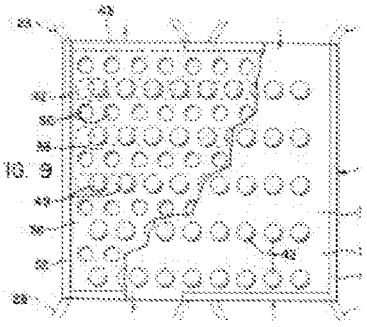
*Regarding claim 12*, Kikuchi teaches a fuel cell [fuel cells 102], comprising a separator [first and second separators 116,118] disposed between two electrolyte-electrode units [membrane electrode assembly (electrolyte electrode assembly) 114] (Abstract; para. 36,37,39; Figs. 1,3-6), wherein

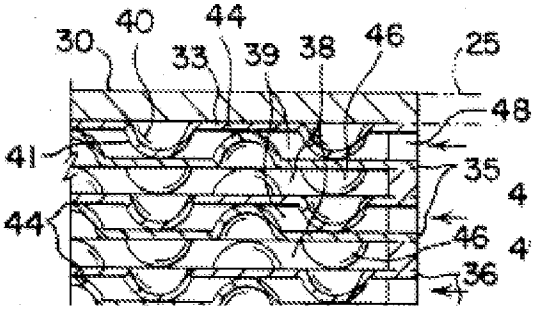
- the separator is formed from two plates, a first and second plate [first and second separators 116,118 that include first and second metal plates 120 and 122, respectively], each having an embossing [embossed protrusions 136,140] and touching at contact surfaces [embossed protrusions 142] (para. 39,44-47; Figs. 3-6), wherein

- the embossings [embossed protrusions 136,140] are formed as circular depressions (Fig. 5), form a reticulated cooling chamber structure covering an entire surface of the separator;
- a first fluid chamber for a coolant [coolant flow passage 146] is formed between the two plates and a second fluid chamber [reactant gas flow passages 134,144] for a gas is formed between each plate and the adjacent electrolyte-electrode unit in each case (para. 44,47,48; Fig. 3,4,6).

Kikuchi does not expressly teach that the embossings of the plates are offset relative to one another such that one circular depression of the first plate is connected to three circular depressions of the second plate by an overflow section; or, the first fluid chamber for the coolant has two subchambers, each subchamber facing one of the two plates, where the subchambers are arranged adjacent and non-planar to each other and separated by a central plane comprising of an overflow section configured to direct the coolant flow alternately through the two and non-planar subchambers.

However, Hulswitt teaches a heat exchanger formed by a plurality of parallel spaced plates with the spaces between the plates defining fluid (or gas) receiving pathways (Abstract; 2:59-64). Each plate includes protuberances staggered with respect to protuberances on an adjacent plate (Abstract). An embodiment of the heat exchanger is depicted in the figures below (Figs. 9,10):





It would have been obvious to one of ordinary skill in the art at the time of the invention to offset the embossings of the separator plates used in the fuel cell of Kikuchi, and produce a first fluid chamber with two subchambers separated by an overflow section as recited in the claim, because Hulswitt teaches that plates configured in this manner facilitate the exchange of heat between fluids by increasing the surface area of the plates and increasing the turbulence of between the plates so that all the fluid can be exposed to the plates (see Hulswitt, 1:45-48).

As to the embossings of the plates being offset relative to one another such that one circular depression of the first plate is connected to three circular depressions of the second plate by an overflow section, it would have been obvious to one having ordinary skill in the art at the time the invention was made to offset the embossing as recited in the claims since it has been held that rearranging parts of an invention involves only routine skill in the art (e.g., *In re Japikse*, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950)), and modified Kikuchi teaches that the plates can be rearranged in a variety of configurations to accomplish the desired heat transfer (see Hulswitt, 5:7-16; Figs. 2-11).

*Regarding claims 22-23*, Kikuchi teaches that the contact surfaces [embossed protrusions 142] are distributed at least approximately uniformly over the surface of the separator (Figs. 3-6).

*Regarding claims 24-27*, Kikuchi does not expressly teach that the total surface area of the contact surfaces is at least 10%, or 90%, of the surface area of the separator.

However, the separator of Kikuchi contacts an electrode-electrolyte unit over an amount, or percentage, of its surface area (Figs. 3-6). A skilled artisan would appreciate that the degree of contact of surface area of the separator plates affects the capacity to cool the fuel cell allowing more or less surface area of coolant to flow through.

Thus, one of ordinary skill in the art at the time of the invention would have found it obvious to assemble the fuel cell of Kikuchi, as modified by Hulswitt, in a manner where the total surface area of the contact surfaces is at least 10% or 90% of the surface area of its separator as recited in claims 24-25 and 26-27, respectively, to optimize the amount of contact surface that affects the volume of coolant in contact with the separator plate depending on the amount of cooling needed by the fuel cell.

*Regarding claim 29*, in addition to the description of the fuel cell of modified Kikuchi as discussed above with respect to claim 12, Hulswitt also teaches that either warm or cool fluids can flow between the plates (2:8-12). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use embossed plates employed in the fuel cell of Kikuchi, as modified by Hulswitt, as a heating device for the cell because Hulswitt teaches that a warm fluid can flow between the plates, and it is well-known in the art as a means with which to provide heat to fuel cell components that allows the cell to continue to operate under conditions below its normal, ambient operating temperature, or to heat the cell during its start-up.

The remaining limitations recited in this claim have been addressed above with respect to claim 12.

*Regarding claim 30*, Kikuchi teaches a separator [first and second separators 116,118 that include first and second metal plates 120 and 122, respectively] disposed between two electrolyte-electrode units [114] (para. 39; Figs. 4,6). The remaining limitations recited in this claim have been addressed above with respect to claims 12 and 29.

9. Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi et al. (US 2003/0162078) in view of Hulswitt et al. (US 4,569,391) as applied to claims 12-13 and 22-27 above, and further in view of Yasuo et al., (US 2002/0187379).

Kikuchi and Hulswitt are applied and incorporated herein for the reasons above.

*Regarding claim 20-21*, Kikuchi does not expressly teach that the contact surfaces are gold-plated.

Yasuo teaches separator for a fuel cell a where the surface of the separator is plated with a precious metal, such as gold, platinum, or nickel, that has high corrosion resistance and high conductivity (Abstract; para. 9).

It would have been obvious to one of ordinary skill in the art at the time of the invention to plate the contact surfaces of the separator used in the fuel cell of Kikuchi, as modified by Hulswitt, because Yasuo teaches that this plating can impart those areas with corrosion resistance and high conductivity.

10. Claims 12-13 and 22-23 under 35 U.S.C. 103(a) as being unpatentable over Mattejat et al. (US 5,472,801) in view of Hulswitt et al. (US 4,569,391).

*Regarding claim 12*, Mattejat teaches a fuel cell [fuel cell block 36], comprising a separator [38] disposed between two electrolyte-electrode units [77,80,82,84,77] (Abstract; 6:54-58; Figs. 4-5), wherein

- the separator is formed from two plates [40,42], a first and a second plate, each having embossings and touching at contact surfaces (Figs. 4-6), wherein
- the embossings are formed as circular depressions, and wherein the embossings of the plates are offset relative to one another forming a reticulated cooling chamber structure covering the entire surface of the separator (5:52-57, 7:41-66; Figs. 4-6);
- a first fluid chamber for a coolant [chamber 72] is formed between the two plates and a second fluid chamber [channels/chambers 74 or 76] for a gas is formed between

each plate and the adjacent electrolyte-electrode unit in each case (6:63-7:6; Figs. 4-6); and

- the first fluid chamber for the coolant has two subchambers, each subchamber facing one of the two plates, where the subchambers are arranged adjacent and non-planar to each other and separated by a central plane comprising of an overflow section configured to direct the coolant flow alternately through the two and non-planar subchambers (7:49-66; Figs. 4-6).

As to the first fluid chamber for the coolant has two subchambers each facing one of the two plates, and the subchambers comprise an overflow section, the cross-sectional images of the fuel cell block of Mattejat shown in Figs. 4-6 illustrate the areas where the protuberances make contact with each other. The fuel cell block shown in those figures can present an a cross-section similar to that described by Applicant in Fig. 2 of its application when a cross section is take in area other than the one shown by Mattejat.

Mattejat does not expressly teach that the embossings of the plates being offset relative to one another such that one circular depression of the first plate is connected to three circular depressions of the second plate by an overflow section. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to dispose embossings relative to one another as recited in the claims because it has been held that rearranging parts of an invention involves only routine skill in the art (e.g., *In re Japikse*, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950)) and Hulswitt teaches that embossed plates can be rearranged in a variety of configurations to accomplish the desired heat transfer (see Hulswitt, 2:37-48, 5:7-16; Figs. 2-11).

*Regarding claim 13*, Mattejat discloses that the plates have at least approximately identical embossings [protuberances] (5:52-57, 7:41-48; Figs. 4-6).

*Regarding claims 22-23*, Mattejat teaches that the contact surfaces are distributed at least approximately uniformly over the surface of the separator (5:53-55; Figs. 4-6).

11. Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mattejat et al. (US 5,472,801) as applied to claims 12-13 and 22-23 above, and further in view of Yasuo et al., (US 2002/0187379).

Mattejat is applied and incorporated herein for the reasons above.

*Regarding claim 20-21*, Mattejat does not expressly teach that the contact surfaces are gold-plated.

Yasuo teaches separator for a fuel cell a where the surface of the separator is plated with a precious metal, such as gold, platinum, or nickel, that has high corrosion resistance and high conductivity (Abstract; para. 9).

It would have been obvious to one of ordinary skill in the art at the time of the invention to plate the contact surfaces of the separator used in the fuel cell of Mattejat because Yasuo teaches that this plating can impart those areas with corrosion resistance and high conductivity.

12. Claims 24-27, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mattejat et al. (US 5,472,801) as applied to claims 12-13 and 22-23 above.

Mattejat is applied and incorporated herein for the reasons above.

*Regarding claims 24-27*, Mattejat does not expressly teach that the total surface area of the contact surfaces is at least 10%, or 90%, of the surface area of the separator.

However, the separators of Mattejat contacts an electrode-electrolyte unit over an amount, or percentage, of its surface area (see 6:54-58; Figs. 4-6). A skilled artisan would

appreciate that the degree of contact of surface area of the separator plates affects the capacity to cool the fuel cell allowing more or less surface area of coolant to flow through.

Thus, one of ordinary skill in the art at the time of the invention would have found it obvious to assemble the fuel cell of Mattejat in a manner where the total surface area of the contact surfaces is at least 10% or 90% of the surface area of its separator as recited in claims 24-25 and 26-27, respectively, to optimize the amount of contact surface that affects the volume of coolant in contact with the separator plate depending on the amount of cooling needed by the fuel cell.

*Regarding claim 29*, in addition to the description of the fuel cell of Mattejat as discussed above with respect to claim 12, Mattejat also teaches a component 38 used in a fuel cell block 36 composed of two plates 40,42 disposed between electrode-electrolyte units (Abstract; 5:34-36, 5:43-48, 6:54-65; Figs. 4-6). The plates form a chamber 72 used to move a coolant 86 through the fuel cell (6:62-66), and, in turn, reduce the cell temperature. The reference also teaches that the component 38 can be used may used not only in a fuel cell block but also in process control apparatuses, such as electrochemical cells, mass transfer equipment, humidifiers and condensers (7:67-8:4).

Mattejat does not expressly teach that its component 38 is a heating device.

However, the component 38 of Mattejat cools a fuel cell using the transport of heat from the higher temperature electrode-electrolyte unit to the lower temperature coolant flowing through a chamber formed between plates of component 38. A skilled artisan would appreciate that: (1) this process can be reversed by flowing a medium through that chamber having a temperature higher than that of the electrode-electrolyte unit; and, (2) the component of Mattejat can be used in another location, such as disposed adjacent to the edge plate of a fuel cell, as evidenced by the alternative uses discussed by Mattejat.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the component of Mattejat as a heating device for a fuel cell because it is well-known in the art as a means with which to provide heat to fuel cell components that allows the cell to continue to operate under conditions below its normal, ambient operating temperature, or to heat the cell during its start-up.

The remaining limitations recited in this claim have been addressed above with respect to claim 12.

*Regarding claim 30*, Mattejat teaches a separator [40,42] disposed between two electrolyte-electrode units [80,82,84] (5:64-6:11; Figs. 4-6). The remaining limitations recited in this claim have been addressed above with respect to claims 12 and 29.

### ***Response to Arguments***

13. Applicant's arguments filed March 28, 2010 with respect to the 35 U.S.C. 102(b) rejection using the Mattejat reference as presented in the previous Office Action, those have been fully considered and, due to the amendments made to the claims, they are persuasive. As noted above, the 35 U.S.C. 102(b) rejection using the Mattejat reference have been withdrawn.

14. As to the remainder of applicant’s arguments, they have been considered but applicant has amended the claims such that new grounds of rejection were necessitated.

### ***Conclusions***

15. The following prior art made of record and not relied upon in the previous Office Action, Dalzell (US 2,281,754) and Enjoji et al. (JP 2003-272698 A), remain considered pertinent to applicant's disclosure.

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Edu E. Enin-Okut** whose telephone number is **571-270-3075**. The examiner can normally be reached on Monday to Thursday, 7 a.m. - 3 p.m. (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Barbara L. Gilliam, can be reached on 571-272-1330. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edu E. Enin-Okut/
Examiner, Art Unit 1727

/Barbara L. Gilliam/
Supervisory Patent Examiner, Art Unit 1727